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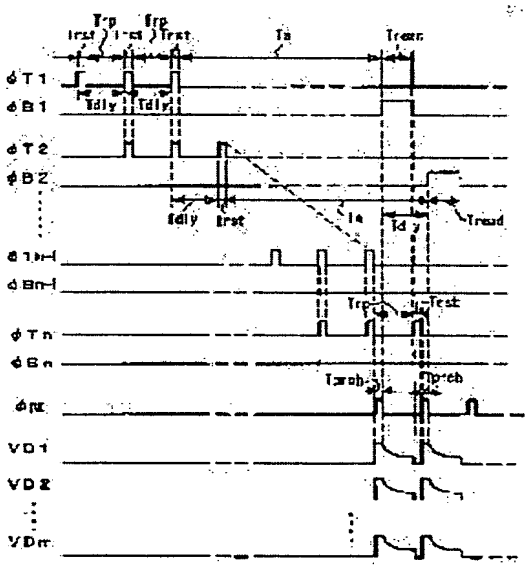
(54) TWO-DIMENSIONAL IMAGE READER AND DRIVE CONTROL METHOD THEREFOR

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a two-dimensional image reader and a drive control method capable of salvaging a photosensor where the defect of reset operation characteristics is generated and excellently reading two-dimensional images while suppressing increase of the entire operation processing time and the rise of the product cost.



SOLUTION: In this two-dimensional image reader provided with a photosensor array for which plural photosensors are arrayed in a matrix for reading the two-dimensional images based on a voltage by electric charges stored in the respective photosensors, at the time of a reset operation performed prior to a light storage operation, reset pulses ϕT1, ϕT2, ϕT3,... and ϕTn composed of plural pulse signals respectively provided with the same pulse wave are impressed for respective rows and the processing of sweeping out the electric charges stored in the photosensor 10 for plural times is executed.

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* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] It corresponds to the two-dimensional image concerning the detected body laid on the photograph sensor array constituted by arranging two or more photosensors in the shape of a matrix. In the two-dimensional image reader which reads said two-dimensional image based on the electrical potential difference by the charge accumulated in each of said photosensor A reset pulse is impressed to the predetermined line of said photograph sensor array, and it has an initialization means to perform initialization which sweeps out the charge accumulated in the photosensor of the line concerned. Said initialization means The two-dimensional image reader characterized by carrying out multiple-times impression of the reset pulse which has a same waveform with a predetermined time interval in said initialization actuation to said photosensor.
[Claim 2] It is the two-dimensional image reader according to claim 1 characterized by having the timing control means which sets up impression timing so that it may synchronize with said reset pulse impressed to the next line of the line concerned which is performing said initialization once [at least] among said reset pulses by which multiple-times impression of said two-dimensional image reader is carried out with said initialization means.
[Claim 3] A precharge means by which said two-dimensional image reader impresses a precharge pulse to said initialized photosensor, The charge storage period which accumulates the charge generated by the irradiated light after said initialization termination passes. And a read-out means to read to said photosensor which the precharge actuation which impresses said precharge pulse ended, and to impress a pulse, Based on said read-out means, it has an output means to output the electrical potential difference by the charge accumulated in said charge storage period as output voltage. Said timing control means The two-dimensional image reader according to claim 2 characterized by carrying out multiple-times impression of said reset pulse with said initialization means on the basis of the sum total time amount of each pulse width of said reset pulse, said precharge pulse, and said read-out pulse.
[Claim 4] Said timing control means is a two-dimensional image reader according to claim 3 characterized by having set up so that said charge storage period can be adjusted gradually by making sum total time amount of each pulse width of said reset pulse, said precharge pulse, and said read-out pulse into unit time amount.
[Claim 5] The impression timing of the precharge pulse according [said timing control means] to said precharge means at least, While setting up the impression timing of said read-out pulse for every [by said read-out means] line so that it may not lap mutually in time The two-dimensional image reader according to claim 3 or 4 characterized by having set up so that it may have the period which laps said charge storage period for every line in time in at least two different spacing.
[Claim 6] The amount of said charge swept out by each of said reset pulse by which multiple-times impression is carried out with said initialization means is a two-dimensional image reader according to claim 1 to 5 characterized by being set up more than the amount of the charge accumulated in said photosensor between [of two or more of these reset pulses] impression timing.
[Claim 7] Said timing control means is a two-dimensional image reader according to claim 2 to 6

characterized by an adjustment setup of the number of said reset pulses impressed by said initialization means being possible.
[Claim 8] Said timing control means is a two-dimensional image reader according to claim 2 to 7 characterized by for said accumulated charge in said initialization actuation to said photosensor sweeping out, and setting up the number of said reset pulses according to a condition.
[Claim 9] The source electrode and drain electrode which were formed across the channel field where said photosensor consists of a semi-conductor layer, At least The upper part of said channel field, the 1st gate electrode caudad formed through the insulator layer respectively, and the 2nd gate electrode, After ****(ing), impressing said reset pulse to said 1st gate electrode, initializing said photosensor and impressing said precharge pulse to said drain electrode, by impressing said read-out pulse to said 2nd gate electrode The two-dimensional image reader according to claim 3 to 8 characterized by outputting the electrical potential difference corresponding to the charge accumulated in said channel field as said output voltage to the charge storage period from said initialization termination to impression of said read-out pulse.
[Claim 10] It corresponds to the two-dimensional image concerning the detected body laid on the photograph sensor array constituted by arranging two or more photosensors in the shape of a matrix. In the drive control approach of a two-dimensional image reader of reading said two-dimensional image based on the electrical potential difference by the charge accumulated in each of said photosensor Impress a reset pulse to the predetermined line of said photograph sensor array, and it has the initialization step which performs initialization which sweeps out the charge accumulated in the photosensor of the line concerned. While said initialization step carries out multiple-times impression of the reset pulse which has a same waveform with a predetermined time interval in said initialization actuation to said photosensor It is the drive control approach of the two-dimensional image reader characterized by setting up impression timing so that it may synchronize with said reset pulse impressed to the next line of the line concerned which is performing said initialization once [at least] among said said reset pulses by which multiple-times impression is carried out.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] About a two-dimensional image reader and its drive control approach, this invention contacts the detected body on the photograph sensor array which arranged two or more photosensors in the shape of a matrix especially, and relates to the two-dimensional image reader which reads the image pattern, and its drive control approach.
[0002]
[Description of the Prior Art] Conventionally, there is a thing of structure which has the photograph sensor array which reads the configuration of detailed irregularity, such as printed matter, and a photograph or a fingerprint, etc., and which is constituted by arranging an optoelectric transducer (photosensor) in the shape of a matrix as a reader of a two-dimensional image. Generally as such a photograph sensor array, solid-state image pickup devices, such as CCD (Charge Coupled Device), are used.
[0003] CCD has the configuration which arranged photosensors, such as a photodiode and a thin film transistor (TFT:ThinFilm Transistor), in the shape of a matrix as everyone knows, detects the amount (the amount of charges) of an electronic-electron hole pair generated corresponding to the quantity of light irradiated by the light sensing portion of each photosensor by the horizontal scanning circuit and the vertical-scanning circuit, and is detecting the brightness of exposure light. In the photograph sensor system using such CCD, since it is necessary to prepare the selection transistor for changing each scanned photosensor into a selection condition according to an individual, it has the problem that the system itself is enlarged as the number of reading pixels increases.
[0004] Then, as a configuration for solving such a problem in recent years, the thin film transistor (henceforth "double-gate mold photosensor") which has the so-called double-gate structure which gave a photograph sense function and selection transistor ability to the photosensor itself is applied to an image reader, and the attempt which attains miniaturization of a system and densification of a pixel is made.
[0005] The image reader using such photosensor The double-gate mold photosensor which equipped the outline and whole surface side of a glass substrate with the top gate electrode and the bottom gate electrode respectively to the common semi-conductor layer at the upper part (upper layer) and a lower part (lower layer) is formed in the shape of a matrix. Exposure light is irradiated from the light source which constituted the photograph sensor array, for example, was prepared in the tooth-back side of a glass substrate. Double-gate mold photosensor detects the reflected light according to the image pattern of two-dimensional images, such as a fingerprint, as light-and-darkness information from the detected body (finger) laid in the detection side of the photograph sensor array upper part, and a two-dimensional image is read.
[0006] Here, in the optical storage time until it reads reading actuation of the image by the photograph sensor array from the time of the initialization termination by impression of a reset pulse and a pulse is impressed, light-and-darkness information is detected based on the accumulated dose of the carrier (electron hole) accumulated for every double-gate mold photosensor. In addition, about the concrete

configuration and actuation of double-gate mold photosensor and a photograph sensor array, it mentions later.

[0007]

[Problem(s) to be Solved by the Invention] By the way, not only in double-gate mold photosensor which was mentioned above but in common photosensor, it originates in the variation on manufacture, the change with time by product use, etc., the component property of photosensor separates from tolerance, and there is a case where it becomes impossible to realize a desired function. For example, sweep out the carrier accumulated in photosensor (discharging a charge), and it sets to the reset action (initialization actuation) which initializes. By remaining without sweeping out a carrier fully and completely in the impression time amount (pulse width) of the reset pulse set up beforehand It had the problem that reading of the above-mentioned image pattern based on the light-and-darkness information for which the accumulated dose of the carrier in optical are recording actuation stops corresponding to the image pattern of the detected body, and is detected in read-out actuation became incorrectness.

[0008] To the defect of such a reset operating characteristic, the thing of the carrier accumulated in photosensor for which it sweeps and **** is performed fully and completely can usually be considered by the approach of lengthening a reset time (reset pulse width of face), the approach of increasing the applied voltage of a reset pulse, etc. However, in the approach of lengthening a reset time (reset pulse width of face), in the processing time of the whole concerning reading of an image of operation becoming long, in the case of the two-dimensional image reader which has adopted the technique of carrying out an adjustment setup of the optical storage time (reading sensibility) based on a reset time, it had the problem that the alignment clearance of reading sensibility became coarse and adjustment precision fell. In addition, based on a reset time, the optical storage time is later mentioned about the technique of carrying out an adjustment setup.

[0009] Moreover, the applied voltage of a reset pulse was set to the approach of increasing, and since a high-voltage power source, a drive circuit of high pressure-proofing, etc. for generating the reset pulse of the high voltage and impressing were needed, it had the problem that the product cost of a two-dimensional image reader went up. Therefore, in the former, about the photosensor which the defect of a reset operating characteristic produced, since it was dealt with as a defective, it had the problem of causing the fall of the production yield, and the ephemeralization of a life cycle.

[0010] Then, controlling increase of the whole processing time of operation, and the rise of product cost in view of the trouble mentioned above, it relieves the photosensor which the defect of a reset operating characteristic produced, and this invention aims at offering the two-dimensional image reader which can read a two-dimensional image good, and its drive control approach.

[0011]

[Means for Solving the Problem] A two-dimensional image reader according to claim 1 corresponds to the two-dimensional image concerning the detected body laid on the photograph sensor array constituted by arranging two or more photosensors in the shape of a matrix. In the two-dimensional image reader which reads said two-dimensional image based on the electrical potential difference by the charge accumulated in each of said photosensor A reset pulse is impressed to the predetermined line of said photograph sensor array, and it has an initialization means to perform initialization which sweeps out the charge accumulated in the photosensor of the line concerned. Said initialization means In said initialization actuation to said photosensor, it is characterized by carrying out multiple-times impression of the reset pulse which has a same waveform with a predetermined time interval.

[0012] That is, in the single initialization actuation which initializes the photosensor of a predetermined line, the capacity which sweeps out the charge accumulated in photosensor at the charge storage period is increased by impressing continuously two or more reset pulses which have the same pulse shape with a predetermined period. Since a reset operating characteristic can be raised by the reset pulse of multiple times even if it is the case where the charge swept depending on 1 time of a reset pulse, and the defect of the reset operating characteristic which is not enough, and degradation arise by this, the effect on the reading image by the charge which remained can be reduced, and improvement in the production yield and protraction of a life cycle can be attained. Moreover, since it has the configuration which increases

the capacity which sweeps out a charge by carrying out multiple-times impression of the reset pulse, it is not necessary to have the power source and the circumference circuit of high pressure-proofing for high-voltage-izing each reset pulse, and the rise of product cost can be controlled.

[0013] Moreover, it is characterized by having the timing control means which sets up impression timing so that it may synchronize with said reset pulse impressed to the next line of the line concerned which is performing said initialization once [at least] among said reset pulses by which multiple-times impression of said two-dimensional image reader is carried out for a two-dimensional image reader according to claim 2 with said initialization means in the configuration of a two-dimensional image reader according to claim 1.

[0014] That is, in the above-mentioned initialization actuation, at least one of two or more reset pulses impressed to the photosensor of a predetermined line is set up so that it may synchronize with one impression timing of two or more reset pulses impressed in initialization actuation of the continued line or the following line. The charge accumulated in photosensor at the charge storage period can be swept out fully and completely, without [without it changes timing of operation etc. a lot according to degradation, a defect, etc. of the component property of photosensor by this even if it is the case which is not enough since a part of processing cycle of initialization actuation can be made to overlap in time for every line, and] increasing the whole processing time of operation.

[0015] Moreover, a two-dimensional image reader according to claim 3 In the configuration of a two-dimensional image reader according to claim 2 said two-dimensional image reader A precharge means to impress a precharge pulse to said initialized photosensor, The charge storage period which accumulates the charge generated by the irradiated light after said initialization termination passes. And a read-out means to read to said photosensor which the precharge actuation which impresses said precharge pulse ended, and to impress a pulse, Based on said read-out means, it has an output means to output the electrical potential difference by the charge accumulated in said charge storage period as output voltage. Said timing control means It is characterized by carrying out multiple-times impression of said reset pulse with said initialization means on the basis of the sum total time amount of each pulse width of said reset pulse, said precharge pulse, and said read-out pulse.

[0016] That is, in the above-mentioned initialization actuation, two or more reset pulses impressed to the photosensor of a predetermined line read with a reset pulse and a precharge pulse, and the sum total time amount of a pulse is impressed to them as a round term. The processing time of operation concerning image reading can be shortened raising a reset operating characteristic by this, since the impression timing between reset pulses is fixable, and a part of processing cycle of initialization actuation can be made to overlap in time for every line.

[0017] Moreover, in the configuration of a two-dimensional image reader according to claim 3, said timing control means makes sum total time amount of each pulse width of said reset pulse, said precharge pulse, and said read-out pulse unit time amount, and the two-dimensional image reader according to claim 4 is characterized by having set up so that said charge storage period can be adjusted gradually.

[0018] Namely, in the two-dimensional image reader constituted so that the reading sensibility of an image could be adjusted, it reads with a reset pulse and a precharge pulse, and the reading sensibility (charge storage period) of an image is gradually adjusted by making sum total time amount of a pulse into a smallest unit. Thereby, according to the image reading operating characteristic of photosensor, based on the above-mentioned unit time amount, reading sensibility can be adjusted suitably, and improvement in the production yield and protraction of a life cycle can be attained. Here, initialization actuation can be performed good, without degrading the above-mentioned unit time amount, i.e., the adjustment precision of reading sensibility, since it has the configuration which carries out multiple-times impression of the reset pulse, without lengthening pulse width of a reset pulse for the purpose of sweeping out the charge accumulated in photosensor fully and completely.

[0019] Moreover, a two-dimensional image reader according to claim 5 In the configuration of a two-dimensional image reader according to claim 3 said timing control means While setting up the impression timing of the precharge pulse by said precharge means, and the impression timing of said

read-out pulse for every [by said read-out means] line at least so that it may not lap mutually in time It is characterized by having set up so that it may have the period which laps said charge storage period for every line in time in at least two different spacing.
[0020] That is, in the above-mentioned initialization actuation, it is set up so that it may read with the precharge pulse which specifies two or more time intervals between reset pulses impressed to the photosensor of a predetermined line and a pulse may not overlap, and on the other hand, it is set up so that both the charge storage times may overlap. The processing time of operation concerning image reading can be shortened raising a reset operating characteristic, since a part of processing cycle of image reading actuation can be made by this to overlap in time for every line, performing image reading actuation good while the impression timing between reset pulses is fixable.
[0021] Moreover, it is characterized by being set up more than the amount of the charge with which a two-dimensional image reader according to claim 6 is accumulated in said photosensor between [of the reset pulse of this plurality / amount / of said charge swept out by each of said reset pulse by which multiple-times impression is carried out with said initialization means in the configuration of a two-dimensional image reader according to claim 1 to 4] impression timing.
[0022] That is, the reset pulse impressed for initialization actuation is set up so that the charge accumulated in the charge storage period which is the purpose of original initialization actuation by two or more reset pulses can be swept out, while being able to sweep out the charge accumulated between reset pulses by each reset pulse. Since original initialization actuation is performed the charge accumulated between reset pulses sweeping by this, and taking **** into consideration, the charge accumulated in the charge storage period can be swept out fully and completely, and a reset operating characteristic can offer a good two-dimensional image reader.
[0023] Moreover, the two-dimensional image reader according to claim 7 is characterized by an adjustment setup of the number of said reset pulses impressed by said initialization means being possible for said timing control means in the configuration of a two-dimensional image reader according to claim 2 to 5. Moreover, the two-dimensional image reader according to claim 8 is characterized by for said accumulated charge in said initialization actuation to said photosensor sweeping out said timing control means, and setting up the number of said reset pulses according to a condition in the configuration of a two-dimensional image reader according to claim 2 to 5.
[0024] That is, a modification setup is carried out so that initialization actuation with suitable variation in the component property at the time of manufacture of photosensor and count of the reset pulse which the charge by initialization actuation sweeps by degradation of the component property by aging, and is impressed in single initialization actuation when **** becomes less enough may be performed. Here, a charge can sweep out and grasp of a condition can be performed artificially or automatically according to the quality of the reading result for example, of a criteria image pattern. While being able to relieve the product currently conventionally dealt with as a defective by this at the time of an examination of products and being able to raise the production yield, after already being shipped as a product, even if it is the case where degradation of the initialization function by aging arises, a reset operating characteristic can be raised, a life cycle can be protracted, and improvement in dependability can be aimed at.
[0025] Furthermore, a two-dimensional image reader according to claim 9 In the configuration of a two-dimensional image reader according to claim 3 to 7 said photosensor The source electrode and drain electrode which were formed across the channel field which consists of a semi-conductor layer, At least The upper part of said channel field, the 1st gate electrode caudad formed through the insulator layer respectively, and the 2nd gate electrode, After ****(ing), impressing said reset pulse to said 1st gate electrode, initializing said photosensor and impressing said precharge pulse to said drain electrode, by impressing said read-out pulse to said 2nd gate electrode It is characterized by outputting the electrical potential difference corresponding to the charge accumulated in said channel field as said output voltage to the charge storage period from said initialization termination to impression of said read-out pulse.
[0026] That is, the above-mentioned photosensor is constituted by reading to the 2nd gate electrode and carrying out pulse impression by the so-called double-gate mold photosensor which outputs the

electrical potential difference corresponding to the charge accumulated in the channel field at the charge storage period while it impresses a reset pulse to the 1st gate electrode to predetermined timing. the photograph sensor device which constitutes a photograph sensor array by this -- a thin shape -- while being able to miniaturize, densification of the reading pixel can be carried out and a detected body image can be read with a high definition.

[0027] And the drive control approach of the two-dimensional image reader concerning claim 10 It corresponds to the two-dimensional image concerning the detected body laid on the photograph sensor array constituted by arranging two or more photosensors in the shape of a matrix. In the drive control approach of a two-dimensional image reader of reading said two-dimensional image based on the electrical potential difference by the charge accumulated in each of said photosensor Impress a reset pulse to the predetermined line of said photograph sensor array, and it has the initialization step which performs initialization which sweeps out the charge accumulated in the photosensor of the line concerned. While said initialization step carries out multiple-times impression of the reset pulse which has a same waveform with a predetermined time interval in said initialization actuation to said photosensor It is characterized by setting up impression timing so that it may synchronize with said reset pulse impressed to the next line of the line concerned which is performing said initialization once [at least] among said said reset pulses by which multiple-times impression is carried out.

[0028] That is, in the single initialization actuation which initializes the photosensor of a predetermined line, the capacity which sweeps out the charge accumulated in photosensor at the charge storage period is increased by impressing continuously two or more reset pulses which have the same pulse shape with a predetermined period. Here, at least one of two or more reset pulses impressed to the photosensor of a predetermined line is set up so that it may synchronize with one impression timing of two or more reset pulses impressed in initialization actuation of the continued line or the following line.

[0029] Since a reset operating characteristic can be raised by the reset pulse of multiple times even if it is the case where the charge swept depending on 1 time of a reset pulse, and the defect of the reset operating characteristic which is not enough, and degradation arise by this, effect in the reading image by the charge which remained can decrease, and improvement in the production yield and protraction of a life cycle can be attained.

[0030] Moreover, since it has the configuration which increases the capacity which sweeps out a charge by carrying out multiple-times impression of the reset pulse, it is not necessary to have the power source and the circumference circuit of high pressure-proofing for high-voltage-izing each reset pulse, and the rise of product cost can be controlled. Furthermore, the charge accumulated in photosensor at the charge storage period can be swept out fully and completely, without [without it changes timing of operation etc. a lot according to degradation, a defect, etc. of the component property of photosensor even if it is the case which is not enough since a part of processing cycle of initialization actuation can be made to overlap in time for every line, and] increasing the whole processing time of operation.

[0031]

[Embodiment of the Invention] Below, the operation gestalt of the two-dimensional image reader concerning this invention is explained in detail. First, it applies to the two-dimensional image reader concerning this invention, and the configuration of good double-gate mold photosensor is explained.

[0032] Drawing 1 is cross-section structural drawing showing the outline configuration of double-gate mold photosensor. As shown in drawing 1 (a), the double-gate mold photosensor 10 The semi-conductor layers 11, such as an amorphous silicon with which an electronic-electron hole pair will be generated if incidence of the excitation light (for example, light) is carried out (channel layer), The impurity layers 17 and 18 which consist of n+ silicon prepared in the both ends of the semi-conductor layer 11, respectively, As opposed to the light chosen from the impurity layer 17, the chromium formed on 18, a chromium alloy, aluminum, an aluminum containing alloy, etc. The opaque drain electrode 12 and the opaque source electrode 13, It consists of transparence electric conduction film, such as ITO formed above the semi-conductor layer 11 (drawing upper part) through the block insulator layer 14 and up (top) gate dielectric film 15. The top gate electrode 21 in which permeability is shown to the light (1st gate electrode), To the lights, such as chromium formed through lower (bottom) gate dielectric film 16

under the semi-conductor layer 11 (drawing lower part), a chromium alloy, aluminum, and an aluminum containing alloy, it has the opaque bottom gate electrode (2nd gate electrode) 22, and is constituted. And the double-gate mold photosensor 10 which has such a configuration is formed on the transparent insulating substrates 19, such as a glass substrate.

[0033] Here, in drawing 1 (a), top gate dielectric film 15, the block insulator layer 14, bottom gate dielectric film 16, and the protection insulator layer 20 prepared on the top gate electrode 21 have the structure which detects only the light which carries out incidence from the drawing upper part by being constituted according to the quality of the material with high permeability, for example, silicon nitride etc., to the light which all excites the semi-conductor layer 11. In addition, generally such double-gate mold photosensor 10 is expressed by the equal circuit as shown in drawing 1 (b). Here, for TG, a top gate terminal and BG are [a source terminal and D of a bottom gate terminal and S] drain terminals.

[0034] Subsequently, the drive control approach of the double-gate mold photosensor mentioned above is explained with reference to a drawing. Drawing 2 is a timing chart which shows an example of the fundamental drive control approach of double-gate mold photosensor, drawing 3 R> 3 is the conceptual diagram of double-gate mold photosensor of operation, and drawing 4 is drawing showing the optical response characteristic of the output voltage of double-gate mold photosensor. Here, it explains, referring to suitably the configuration (drawing 1) of the double-gate mold photosensor mentioned above.

[0035] First, it sets to a reset action (initialization actuation, initialization step). it is shown in drawing 2 and drawing 3 (a) -- as -- top gate terminal TG of the double-gate mold photosensor 10 -- a pulse voltage (; hereafter described as a "reset pulse" -- for example) High level phiT of Vtg=+15V is impressed and the carrier (here electron hole) accumulated near the interface with the semi-conductor layer 11 and the semi-conductor layer 11 in the block insulator layer 14 is emitted (reset period Trst).

[0036] Subsequently, in optical are recording actuation, as shown in drawing 2 and drawing 3 R> 3 (b), by impressing bias voltage phiT of a low level (for example, Vtg=-15V) to top gate terminal TG, a reset action is ended and the optical are recording period (charge storage actuation) Ta by carrier are recording actuation starts. In the optical are recording period Ta, an electronic-electron hole pair is generated according to the quantity of light which carried out incidence from the top gate electrode 21 side, the incidence service area, i.e., the carrier generating field, of the semi-conductor layer 11, and an electron hole is accumulated around near the interface with the semi-conductor layer 11 and the semi-conductor layer 11 in the block insulator layer 14 (i.e., a channel field).

[0037] And based on precharge signal phipg, the predetermined electrical potential difference (precharge electrical potential difference) Vpg is impressed to the drain terminal D, and a charge is made to hold to the drain electrode 12 in parallel to the optical are recording period Ta in precharge actuation, as shown in drawing 2 R> 2 and drawing 3 (c) (precharge period Tprch). Subsequently, in read-out actuation, as shown in drawing 2 and drawing 3 (d), after the precharge period Tprch passes, the double-gate mold photosensor 10 is changed into ON condition by impressing bias voltage (read-out selection signal; it being hereafter described as "read-out pulse") phiB of high level (for example, Vbg=+10V) to bottom gate terminal BG (read-out period Tread).

[0038] It sets here at the read-out period Tread. In order that the carrier (electron hole) accumulated in the channel field may work in the direction which eases Vtg (-15V) impressed to top gate terminal TG of reversed polarity, An n channel is formed of Vbg (+15V) of bottom gate terminal BG, and according to a drain current, as the electrical potential difference (drain electrical potential difference) VD of the drain terminal D is shown in drawing 4 (a), the inclination to fall gradually with the passage of time from the precharge electrical potential difference Vpg is shown.

[0039] That is, when the carrier (electron hole) is not accumulated in a channel field in the state of dark, as it is shown in drawing 3 (e), when the optical are recording condition in the optical are recording period Ta applies negative bias to top gate terminal TG, the positive bias of bottom gate terminal BG will be negated, the double-gate mold photosensor 10 will be in an OFF condition, and as shown in drawing 4 (a), the drain electrical potential difference VD will be held almost as it is.

[0040] On the other hand, since the carrier (electron hole) according to the amount of incident light is

captured to the channel field as shown in drawing 3 R> 3 (d) when an optical are recording condition is bright state, it acts so that the negative bias of top gate terminal TG may be negated, and, as for the double-gate mold photosensor 10, only this part to have been denied will be in ON condition by the positive bias of bottom gate terminal BG. And according to ON resistance according to this amount of incident light, as shown in drawing 4 (a), the drain electrical potential difference VD will fall.

[0041] As shown in drawing 4 (a), therefore, the change inclination of the drain electrical potential difference VD From the termination point in time of the reset action by impression of reset pulse phiT to top gate terminal TG It relates to the quantity of light which received light to time amount (optical are recording period Ta) until it reads to bottom gate terminal BG and pulse phiB is impressed deeply, when there are few accumulated carriers, the inclination to fall gently is shown, and when there are many accumulated carriers, the inclination to fall steeply is shown. Therefore, the quantity of light of exposure light is converted the read-out period Tread starting and detecting the drain electrical potential difference VD after predetermined time amount progress, or by detecting time amount until it results in the electrical potential difference on the basis of a predetermined threshold electrical potential difference.

[0042] In addition, in the timing chart shown in drawing 2 , if the condition of having impressed a low level (for example, Vbg=0V) to bottom gate terminal BG is continued as shown in drawing 3 (f) and (g) after progress of the precharge period Tprch, the double-gate mold photosensor 10 will maintain an OFF condition, and as shown in drawing 4 (b), the drain electrical potential difference VD will hold the precharge electrical potential difference Vpg. Thus, the optional feature which chooses the read-out condition of the double-gate mold photosensor 10 is realized according to the impression condition of the electrical potential difference to bottom gate terminal BG.

[0043] Subsequently, the photograph sensor system equipped with the photograph sensor array constituted by carrying out two-dimensional array of the double-gate mold photosensor mentioned above is explained with reference to a drawing. Drawing 5 is the outline block diagram of the photograph sensor system equipped with the photograph sensor array constituted by carrying out two-dimensional array of the double-gate mold photosensor.

[0044] As shown in drawing 5 , a photograph sensor system It divides roughly. Much double-gate mold photosensors 10 For example, the photograph sensor array 100 arranged in the shape of [of a n line xm train] a matrix, The top gate line 101 and the bottom gate line 102 which connect and carry out the distraction of top gate terminal TG (top gate electrode 21) and bottom gate terminal BG (bottom gate electrode 22) of each double-gate mold photosensor 10 to a line writing direction respectively, While connecting the source terminal S (source electrode 13) with the drain line (data line) 103 which connected the drain terminal D of each double-gate mold photosensor 10 (drain electrode 12) in the direction of a train in the direction of a train The source line (common line) 104 connected to touch-down potential, and the top gate driver 110 connected to the top gate line 101 (initialization means), The bottom gate driver 120 connected to the bottom gate line 102 (read-out means), It has the drain driver (a precharge means, output means) 130 which consists of the column switch 131 connected to the drain line 103, a precharge switch 132, and amplifier 133, and is constituted.

[0045] In addition, in drawing 5 , a control signal for phitg and phibg to generate a reset pulse phiT1, phiT2, --phiTi, --phiTn and the read-out pulse phiB1, phiB-2, --phiBi, --phiBn, respectively and phipg are precharge signals which control the timing which impresses the precharge electrical potential difference Vpg.

[0046] In such a configuration, by impressing a predetermined electrical potential difference to top gate terminal TG through the top gate line 101 from the top gate driver 110 A photograph sense function is realized and the bottom gate line 102 is minded from the bottom gate driver 120. A predetermined electrical potential difference is impressed to bottom gate terminal BG, it reads by incorporating the drain electrical potential difference of the double-gate mold photosensor 10 on the column switch 131 through the drain line 103, and outputting as output voltage Vout, and a function is realized.

[0047] By the way, the drive control approach of the photograph sensor system mentioned above Although it realizes by repeating to the line count part serial (serial) of the matrix which constitutes a photograph sensor array fundamentally by making into 1 processing cycle the drive control approach

(referring to drawing 2) of the double-gate mold photosensor mentioned above For example, in order to make reading precision highly minute, when densification of the photograph sensor array is carried out, the duration for reading actuation increases and it is not desirable in respect of utilization of a photograph sensor system. Then, in the photograph sensor system using double-gate mold photosensor, the drive control approach as shown below is applicable good.

[0048] Drawing 6 is a timing chart which shows an example of the drive control approach of the photograph sensor system mentioned above. Here, the drive control approach is explained, referring to suitably the configuration of the photograph sensor system shown in drawing 5 . As shown in drawing 6 , first, sequential impression of a reset pulse phiT1, phiT2, and the --phiTn is carried out through the top gate line 101 from the top gate driver 110, the reset period Trst is started, and the double-gate mold photosensor 10 for every line is initialized.

[0049] Subsequently, when a reset pulse phiT1, phiT2, --phiTn fall one by one and the reset period Trst expires, the optical are recording period Ta starts, and a charge (electron hole) is generated and accumulated in a channel field according to the quantity of light by which incidence is carried out to the double-gate mold photosensor 10 for every line. Here, as shown in drawing 6 , precharge actuation which the precharge period Tprch is started [actuation], and the precharge electrical potential difference Vpg is impressed [actuation] to the drain line 103, and makes a predetermined electrical potential difference hold to the drain electrode of the double-gate mold photosensor 10 for every line is performed by impressing precharge signal phipg to the drain driver 130 [within the optical are recording period Ta].

[0050] Subsequently, the double-gate mold photosensor 10 which the optical are recording period Ta and the precharge period Tprch ended is received. To the impression timing of each signal for the reset action in other lines, precharge actuation, and read-out actuation, and the timing which does not lap with a time amount target The bottom gate line 102 is minded from the bottom gate driver 120 for every line. Carry out sequential impression of the read-out pulse phiB1, phiB-2, and the --phiBn, and the read-out period Tread is started. Change of the drain electrical potential differences VD1, VD2, and VD3 corresponding to the charge accumulated in the double-gate mold photosensor 10 for every line, and --VDm by the drain driver 130 It detects to coincidence through each drain line 103, and reads as output voltage Vout which consists of serial data or parallel data.

[0051] In this drive control approach Namely, the reset pulse phiT1 for every line, phiT2, phiT3, --phiTn, As shown in a degree type, spacing (Tdly) of the read-out pulse phiB1, phiB-2, phiB3, --phiBn, and the impression timing of precharge signal phipg It is set as the sum total time amount of the reset period Treset by the reset pulse, the read-out period Tread by the read-out pulse, and the precharge period Tprch by the precharge signal. Tdly=Trst+Tprch+Tread By this, a reset action, precharge actuation, and read-out actuation lap in time, and are not performed (in synchronization)... (1) -- Furthermore, since a part of processing cycle for every line can be made to overlap in time The processing time concerning read-out actuation can be shortened sharply, being able to perform read-out actuation and performing read-out actuation of a two-dimensional image good, before the reset action in all lines is completed.

[0052] Moreover, this means that read-out actuation can be performed good, without increasing sharply the processing time concerning read-out actuation of a two-dimensional image, even if it is the case where the time amount of the integral multiple is added to the optical are recording period Ta by making the above-mentioned spacing (Tdly) into a criteria unit if it puts in another way. Therefore, making a part of processing cycle for every line overlap in time, by carrying out a modification setup of the optical storage time Ta gradually, when the image which can carry out adjustment control as a smallest unit at arbitration, and is applied [spacing / (Tdly) / above-mentioned] to the detected body in the reading sensibility of a two-dimensional image is dark, reading sensibility can be made high and reading actuation can be performed good.

[0053] Next, 1 operation gestalt of the two-dimensional image reader concerning this invention is explained with reference to a drawing. In addition, in the operation gestalt shown below, although the case where the double-gate mold photosensor mentioned above as photosensor is applied is shown, the

configuration of this invention is not limited to this double-gate mold photosensor, and it cannot be overemphasized that it is what is similarly applied to the photograph sensor system using the photosensor of the configuration of others, such as a photodiode and TFT. Drawing 7 is the block diagram showing the whole two-dimensional image reader configuration concerning this invention. In addition, it explains here, referring to suitably the configuration shown in drawing 1 and drawing 5 . Moreover, the same sign is attached and explained about a configuration equivalent to the photograph sensor system shown in drawing 5 .

[0054] As shown in drawing 7 , the two-dimensional image reader concerning this invention The photograph sensor array 100 constituted by carrying out two-dimensional array of the double-gate mold photosensor 10 like the photograph sensor system shown in drawing 5 , The top gate driver 110 which impresses a reset pulse to top gate terminal TG of the double-gate mold photosensor 10, The bottom gate driver 120 which reads to bottom gate terminal BG of the double-gate mold photosensor 10, and impresses a pulse, The drain driver 130 which consists of the column switch 131 which performs impression of the precharge electrical potential difference to the double-gate mold photosensor 10, and read-out of a drain line electrical potential difference, a precharge switch 132, and amplifier 133, The analog-digital converter 140 which changes the read drain line electrical potential difference (analog signal) into the image data which consists of a digital signal (it is hereafter described as an A/D converter), While performing the reading motion control of the detected body image by the photograph sensor array 100, an exchange of data with the external function part 200, etc. The controller 150 equipped with the timing control function which controls the impression timing of each pulse signal relevant to a series of reset actions mentioned above, optical are recording actuation, precharge actuation, and read-out actuation (timing control means), It has RAM130 which memorizes reading image data etc., and is constituted.

[0055] Here, since the photograph sensor array 100, the top gate driver 110, the bottom gate driver 120, and the drain driver 130 have the configuration and function of a photograph sensor system and an abbreviation EQC which were shown in drawing 5 , they omit the detailed explanation. The controller 150 concerning this operation gestalt controls the actuation which impresses a predetermined signal level (reset pulse phiTi, read-out pulse phiBi) to top gate terminal TG and bottom gate terminal BG of each double-gate mold photosensor 10 which constitute the photograph sensor array 100 from each of the top gate driver 110 and the bottom gate driver 120 by outputting control signal phitg and phibg to the top gate driver 110 and the bottom gate driver 120. Moreover, by outputting precharge signal phipg to the precharge circuit 131, the precharge electrical potential difference Vpg is impressed to the drain terminal D of each double-gate mold photosensor 10, and the actuation which detects the drain electrical potential difference VD according to the amount of charges accumulated in each double-gate mold photosensor 10 corresponding to the image pattern of the detected body is controlled.

[0056] Moreover, the output voltage Vout read by the drain driver 130 is changed into a digital signal through A/D converter 140, and it is inputted into a controller 150 as image data. A controller 150 is equipped also with the function as an interface to the external function part 200 which performs predetermined processing of collating of image data, processing, etc. while a predetermined image processing is performed or it performs writing to RAM160, and read-out to this image data.

[0057] Especially the controller 150 by making a setting change of the control signal outputted to the top gate driver 111, the bottom gate driver 112, and an output circuit 116 Impression timing, such as a reset pulse in the drive control processing mentioned later, a read-out pulse, and a precharge pulse, is set up so that predetermined conditions may be fulfilled. It has the enough and perfect function of the charge in a reset action to sweep out and to realize the optimal sensibility (optical are recording period Ta) setup for compaction of the reading time amount of a photographic subject image, and image reading.

[0058] Next, an example of the drive control approach of the two-dimensional image reader concerning this operation gestalt is explained with reference to a drawing. In addition, setting control of the impression timing of the pulse signal in each actuation shown below is carried out by the controller mentioned above. Drawing 8 is a timing chart which shows an example of the drive control approach of the two-dimensional image reader concerning this operation gestalt. Here, the drive control approach is

explained, referring to suitably the timing chart shown in the photograph sensor system and drawing 6 which were shown in drawing 5 . As shown in drawing 8 , first, to each of the top gate line 101 which connects top gate terminal TG of the double-gate mold photosensor 10 to a line writing direction, the drive control approach concerning this operation gestalt carries out sequential impression of the reset pulse phiT1 which consists of a pulse signal of plurality (here 3 times) which has the respectively same pulse shape, phiT2, and the --phiTn, starts the reset period Trst, and initializes the double-gate mold photosensor 10 for every line to it.

[0059] That is, in the reset action of a single (1 time), processing which sweeps out the charge accumulated in photosensor 10 two or more times by two or more pulse signals impressed continuously the predetermined period Tdly is performed. Here, a period Tdly is equal to spacing of the reset pulse phiT1 for every line, phiT2, phiT3, --phiTn, the read-out pulse phiB1, phiB-2, phiB3, --phiBn, and the impression timing of precharge signal phipg, as shown in the above-mentioned (1) formula.

[0060] Subsequently, when the last pulse signal falls among two or more pulse signals which constitute a reset pulse phiT1, phiT2, --phiTn and the reset period Trst expires, the optical are recording period Ta starts, and a charge (electron hole) is generated and accumulated in a channel field according to the quantity of light by which incidence is carried out from the top gate electrode side of the double-gate mold photosensor 10 for every line. Here, as shown in drawing 8 , precharge actuation which the precharge period Tprch is started [actuation], and a precharge electrical potential difference is impressed [actuation] to the drain line 103, and makes a predetermined electrical potential difference hold to the drain electrode of the double-gate mold photosensor 10 is performed [within the optical are recording period Ta] by carrying out sequential impression of the precharge signal phipg for every line.

[0061] Subsequently, the double-gate mold photosensor 10 which the optical are recording period Ta and the precharge period Tprch ended is received like the timing chart shown in drawing 6 . To the timing which does not lap with each pulse signal concerning other reset actions in a line, precharge actuation, and read-out actuation, and a time amount target The read-out pulse phiB1, phiB-2, --phiBn are impressed to the bottom gate line 102 one by one for every line. The read-out period Tread is started and the electrical-potential-difference change VD1, VD2, and VD3 corresponding to the charge accumulated in the double-gate mold photosensor 10 and --VDm are read through the drain line 103 with the column switch 131. The read-out period Tread starts the electrical potential differences VD1, VD2, and VD3 of each drain line 103, and the fall inclination of --VDm here like the conventional technique which mentioned above the detection approach of the exposure quantity of light. The exposure quantity of light is converted detecting the electrical-potential-difference value after predetermined time amount progress, or by detecting time amount until it results in the electrical-potential-difference value on the basis of a predetermined threshold electrical potential difference.

[0062] As mentioned above, in this operation gestalt, the pulse signal which has the reset pulse phiT1 shown in drawing 6 mentioned above as a reset pulse impressed for every line at the time of a reset action, phiT2, phiT3, and the same pulse shape as --phiTn is impressed to a multiple-times continuation target. That is, the capacity which sweeps out the charge accumulated in photosensor 10 at the optical are recording period Ta increases by impressing two or more pulse signals as a reset pulse. Here, the impression timing of each pulse signal is set up so that it may become equal to the impression period Tdly of the reset pulse phiT1 for every line shown in drawing 6 mentioned above, phiT2, phiT3, --phiTn (it reads with a reset pulse and a precharge charge pulse, and is the sum total time amount of a pulse). Thereby, at least one or more of two or more pulse signals impressed for every line at the time of a reset action are set up so that it may synchronize with the impression timing of the pulse signal of the reset action in other lines.

[0063] Therefore, by the defect of the reset operating characteristic of photosensor 10, or degradation, by 1 time of the reset pulse (pulse signal) in a reset action, even if a charge sweeps and it is the case which is not enough, by impressing two or more pulse signals continuously, a charge can sweep and **** can be performed fully and completely. Thus, since it has the configuration which increases the capacity which sweeps out a charge by impressing two or more pulse signals, it is necessary to have neither a high-voltage power source nor the circumference circuit of high pressure-proofing, and the rise

of product cost can be controlled as compared with the technique of increasing the capacity which high-voltage-izes applied voltage of a reset pulse, and sweeps it out.
[0064] Moreover, a charge can be swept out fully and completely, without [since a part or all of a processing cycle can be made to overlap in time by synchronizing impression of two or more pulse signals with impression of the pulse signal in other lines, without it changes timing of operation etc. greatly, and] increasing the processing time concerning the whole image reading actuation. Thus, since it has the configuration which increases the capacity which sweeps out a charge by impressing two or more pulse signals, as compared with the technique of increasing the capacity which lengthens pulse width of a reset pulse and sweeps it out, increase of the processing time concerning image reading actuation can be controlled.
[0065] In addition, the increment of the processing time concerning the image reading actuation in this operation gestalt As compared with the reset pulse phiT1 shown in drawing 6 , phiT2, phiT3, --phiTn, are equivalent to the time amount concerning impression of two or more pulse signals added in the reset action. Specifically It becomes the time amount (this operation gestalt 2xTdly) which multiplied the number of the increased pulse signals by the impression period of a pulse signal, and by the increment in slight time amount, a charge can sweep out and improvement in capacity can be aimed at.
[0066] Furthermore, in order to sweep out the charge accumulated in photosensor fully and completely Since it has the configuration which carries out multiple-times impression of the reset pulse, without lengthening pulse width of a reset pulse the time interval Tdly concerning the above-mentioned (1) formula -- a smallest unit -- carrying out -- the reading sensibility (the optical storage time Ta) of an image -- adjustment, if it is when the controllable drive control approach is applied The above-mentioned reset action can be performed good, without degrading a time interval Tdly, i.e., the adjustment precision of reading sensibility.
[0067] By the way, it sets to the drive control approach concerning this operation gestalt. Specific precharge actuation [in / as shown in drawing 8 / a line] and read-out actuation (for example, the precharge pulse of the 1st line and the read-out pulse phiB1), When the processing cycle of the reset action (for example, two or more pulse signals which constitute the reset pulse of the n-th line) of other lines overlaps in time A precharge (1st line) pulse will be impressed immediately after impression of a reset pulse. (The n-th line) Optical are recording actuation is performed between [which can be set to a reset action / two or more / Tprch] pulse signals (i.e., a precharge period), and between the read-out period Tread (Trp), and the phenomenon in which a charge is accumulated arises.
[0068] Therefore, each of two or more pulse signals impressed for every line in a reset action While having the capacity which sweeps out fully and completely at least the charge accumulated in the time amount Trp between the last pulse signals Pulse width, applied voltage, etc. need to be set up so that it may have the capacity which sweeps out fully and completely the charge accumulated in the optical are recording period Ta for every line by two or more whole pulse signals impressed in a reset action.
[0069] Next, other operation gestalten of the two-dimensional image reader concerning this invention are explained. In addition, since the two-dimensional image reader concerning this operation gestalt has the configuration equivalent to the two-dimensional image reader (drawing 7) mentioned above, it explains only a configuration peculiar to this operation gestalt in detail, and omits the publication about other configurations. The two-dimensional image reader concerning this operation gestalt be equip with the function which carry out adjustment control of the count of the reset pulse (pulse signal) impress at the time of a reset action in the configuration showed in drawing 7 according to degradation or the defect of the reset operating characteristic in the photograph sensor system with which a controller 150 consist of the photograph sensor array 100 , the top gate driver 110 , a bottom gate driver 120 , and a drain driver 130 .
[0070] In the two-dimensional image reader which has such a configuration, it originates in the variation on manufacture of the component property of photosensor etc. in the inspection phase in a manufacturer. or when it originates in degradation of the component property of a product [finishing / shipment] with time and the defect of a reset operating characteristic is detected For example, by operating a controller 150 artificially, the count of the pulse signal concerning a reset action is set as arbitration, a charge

sweeps out and capacity as well as the operation gestalt mentioned above is increased. At this time, the impression timing of the newly added pulse signal is set up considering the time interval Tdly of the above-mentioned (1) formula as a period. Thereby, conventionally, while being able to relieve the product dealt with by the reset malfunction as a defective in the inspection phase and being able to aim at improvement in the production yield, the life of the already shipped product can be protracted and improvement in dependability can be aimed at.

[0071] In addition, the above-mentioned controller 150 may detect degradation or the defect of the reset operating characteristic in a photograph sensor system, and may have the function which carries out a modification setup of the count of a reset pulse automatically. The actual measurement of the criteria image pattern which was specifically equipped with ROM (illustration is omitted) which stored the information about a criteria image pattern in the interior of a controller 150, and was read by periodical maintenance etc., The reference value stored in ROM is compared, and when extent of the abnormalities by the reset malfunction judges that it has separated from predetermined tolerance, processing which increases the one number of the pulse signals concerning a reset action (count) is performed. Since a modification setup of the number of the pulse signals concerning a reset action can be carried out appropriately and a reset operating characteristic can be raised by such drive control approach even if it is the case where degradation of the reset operating characteristic by aging arises, after already being shipped as a product, a life cycle can be protracted and improvement in much more dependability can be aimed at.

[0072]

[Effect of the Invention] In the single initialization actuation which initializes the photosensor of a predetermined line, by impressing continuously two or more reset pulses which have the same pulse shape with a predetermined period, according to the two-dimensional image reader concerning this invention, and its drive control approach, it is constituted so that the capacity which sweeps out the charge accumulated in photosensor at the charge storage period may be increased. And at least one of two or more reset pulses impressed to the photosensor of a predetermined line is set up so that it may synchronize with one impression timing of two or more reset pulses impressed in initialization actuation of the continued line or the following line.

[0073] Therefore, since a reset operating characteristic can be raised by the reset pulse of multiple times even if it is the case where the charge swept depending on 1 time of a reset pulse, and the defect of the reset operating characteristic which is not enough, and degradation arise, effect in the reading image by the charge which remained can decrease, and improvement in the production yield and protraction of a life cycle can be attained. Moreover, since it has the configuration which increases the capacity which sweeps out a charge by carrying out multiple-times impression of the reset pulse, it is not necessary to have the power source and the circumference circuit of high pressure-proofing for high-voltage-izing each reset pulse, and the rise of product cost can be controlled. Furthermore, the charge accumulated in photosensor at the charge storage period can be swept out fully and completely, without [without it changes timing of operation etc. a lot according to degradation, a defect, etc. of the component property of photosensor even if it is the case which is not enough since a part of processing cycle of initialization actuation can be made to overlap in time for every line, and] increasing the whole processing time of operation.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL FIELD

[Field of the Invention] About a two-dimensional image reader and its drive control approach, this invention contacts the detected body on the photograph sensor array which arranged two or more photosensors in the shape of a matrix especially, and relates to the two-dimensional image reader which reads the image pattern, and its drive control approach.

[Translation done.]

PRIOR ART

[Description of the Prior Art] Conventionally, there is a thing of structure which has the photograph sensor array which reads the configuration of detailed irregularity, such as printed matter, and a photograph or a fingerprint, etc., and which is constituted by arranging an optoelectric transducer (photosensor) in the shape of a matrix as a reader of a two-dimensional image. Generally as such a photograph sensor array, solid-state image pickup devices, such as CCD (Charge Coupled Device), are used.

[0003] CCD has the configuration which arranged photosensors, such as a photodiode and a thin film transistor (TFT:ThinFilm Transistor), in the shape of a matrix as everyone knows, detects the amount (the amount of charges) of an electronic-electron hole pair generated corresponding to the quantity of light irradiated by the light sensing portion of each photosensor by the horizontal scanning circuit and the vertical-scanning circuit, and is detecting the brightness of exposure light. In the photograph sensor system using such CCD, since it is necessary to prepare the selection transistor for changing each scanned photosensor into a selection condition according to an individual, it has the problem that the system itself is enlarged as the number of reading pixels increases.

[0004] Then, as a configuration for solving such a problem in recent years, the thin film transistor (henceforth "double-gate mold photosensor") which has the so-called double-gate structure which gave a photograph sense function and selection transistor ability to the photosensor itself is applied to an image reader, and the attempt which attains miniaturization of a system and densification of a pixel is made.

[0005] The image reader using such photosensor The double-gate mold photosensor which equipped the outline and whole surface side of a glass substrate with the top gate electrode and the bottom gate electrode respectively to the common semi-conductor layer at the upper part (upper layer) and a lower part (lower layer) is formed in the shape of a matrix. Exposure light is irradiated from the light source which constituted the photograph sensor array, for example, was prepared in the tooth-back side of a glass substrate. Double-gate mold photosensor detects the reflected light according to the image pattern of two-dimensional images, such as a fingerprint, as light-and-darkness information from the detected body (finger) laid in the detection side of the photograph sensor array upper part, and a two-dimensional image is read.

[0006] Here, in the optical storage time until it reads reading actuation of the image by the photograph sensor array from the time of the initialization termination by impression of a reset pulse and a pulse is impressed, light-and-darkness information is detected based on the accumulated dose of the carrier (electron hole) accumulated for every double-gate mold photosensor. In addition, about the concrete configuration and actuation of double-gate mold photosensor and a photograph sensor array, it mentions later.

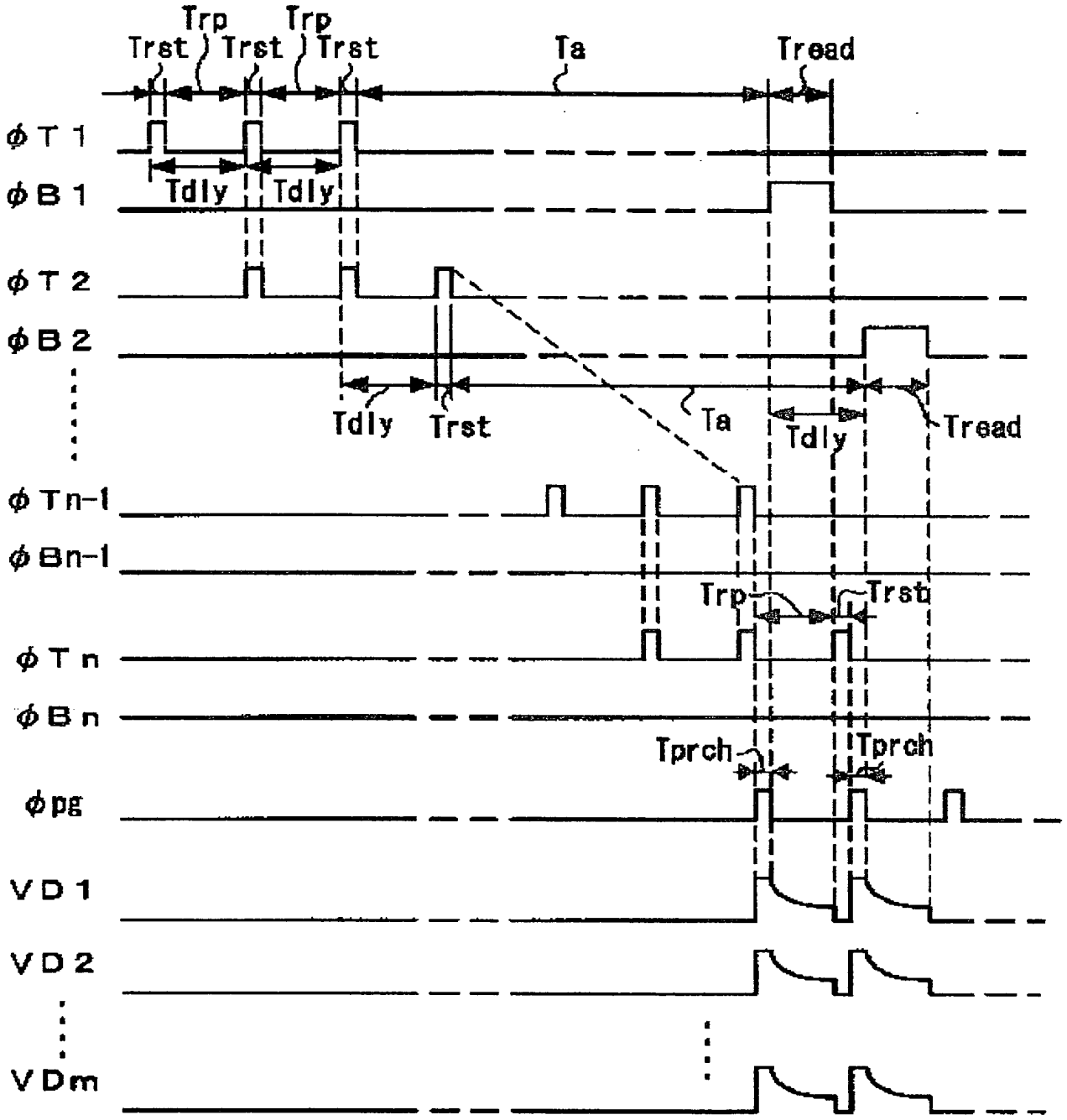
[Translation done.]

EFFECT OF THE INVENTION

[Effect of the Invention] In the single initialization actuation which initializes the photosensor of a predetermined line, by impressing continuously two or more reset pulses which have the same pulse shape with a predetermined period, according to the two-dimensional image reader concerning this invention, and its drive control approach, it is constituted so that the capacity which sweeps out the charge accumulated in photosensor at the charge storage period may be increased. And at least one of two or more reset pulses impressed to the photosensor of a predetermined line is set up so that it may synchronize with one impression timing of two or more reset pulses impressed in initialization actuation of the continued line or the following line.

[0073] Therefore, since a reset operating characteristic can be raised by the reset pulse of multiple times even if it is the case where the charge swept depending on 1 time of a reset pulse, and the defect of the reset operating characteristic which is not enough, and degradation arise, effect in the reading image by the charge which remained can decrease, and improvement in the production yield and protraction of a life cycle can be attained. Moreover, since it has the configuration which increases the capacity which sweeps out a charge by carrying out multiple-times impression of the reset pulse, it is not necessary to have the power source and the circumference circuit of high pressure-proofing for high-voltage-izing each reset pulse, and the rise of product cost can be controlled. Furthermore, the charge accumulated in photosensor at the charge storage period can be swept out fully and completely, without [without it changes timing of operation etc. a lot according to degradation, a defect, etc. of the component property of photosensor even if it is the case which is not enough since a part of processing cycle of initialization actuation can be made to overlap in time for every line, and] increasing the whole processing time of operation.

[Translation done.]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